Entomologists' NEWSLETTER

Volume I April, 1971 Number 4

(**Please see article on Carbofuran Seed treatment on page 30**)

Issued by
DIVISION OF ENTOMOLOGY
INDIAN AGRICULTURAL RESEARCH INSTITUTE
NEW DELHI-12.

Some more Appreciations

.....The newsletter is quite useful and full of information.....I wish to congratulate you on starting this Newsletter. My only suggestion is that the scope of this Newsletter may be enlarged.

A.R. Seshadri
Head, Division of Nematology
I.A.R.I., New Delhi-12.

.....This will be the nucleus, I am sure, for many important discoveries in future.....

D.C. Dakshinamurti
Head, Division of Agricultural Physics
I.A.R.I., New Delhi-12.

.....I am sure this will be a source of valuable information for people engaged in the field of Entomology and related areas.

A.M. Michael
Professor, Water Technology Centre
I.A.R.I., New Delhi-12.

.....I have read it with great interest. Will you kindly put my name on the mailing list ?.....

R.S. Saini
Associate Professor
Tuskegee Institute, College of Arts & Sciences
Division of Natural Sciences Deptt. of Biology
Albama 36088 (U.S.A.).

.....This venture of yours opens up a new channel of communication among the scientists interested in the discipline of Entomology as well as those engaged in sister disciplines. Your article on "Revolution in Pest Control" is thought provoking and I hope that the suggestions made regarding the adequate surveillance of pests will be taken up in this country.....

B.L. Wattal
Deputy Director
National Institute of Communicable Diseases
New Delhi.

Policy Regarding Mixing of Pesticides in Food and Feed Grains

According to the existing rules made for the prevention of adulteration in food by the Ministry of Health, Government of India, the mixing of pesticides with food grain is prohibited. Also the policy followed by the Indian Agricultural Research Institute has been from the very beginning not to recommend the treatment of food grain with any pesticide except fumigants. In spite of these prohibitions both from official and scientific sources it is believed that some ignorant or unscrupulous people have been treating food grains with easily available insecticides like DDT and BHC. This has been causing increasing concern both to scientists and to public in general and various common sense solutions have been suggested. One of the suggestions has been the exploration and recommendation of safer substitutes for insecticides like DDT and BHC and as a consequence of this line of approach certain substitutes are being offered now in the form of some safer members of the organophosphorous group. Hence the intention of this note is to stimulate some open thinking on this topic to avoid our jumping from the frying pan to the fire.

This problem has to be viewed from several angles, *viz.*—

(a) The defects of an insecticide come up with time after it is introduced. For example DDT being the oldest of the modern insecticides, it has been attacked from all possibles angles and practically all its bad points are well established. Hence it is the main target so far as the adverse effects of pesticides are concerned. Hence not much effort is needed to decry it and persuade people against its use. The same is not so easy with a newer insecticide like malathion against which we do not know as much as we know against DDT. The result is that some people are coming up with the recommendation that malathion should be mixed with food grains. The following considerations will show that such a recommendation is analogous to jumping from the frying pan to the fire. Certainly we should take all possible actions against the DDT treatment of food grains but the recommendation of malathion is not a solution; otherwise the solution may prove to be far more dangerous than the problem itself

(i) The greatest apprehension against DDT is due to its cummulative nature. It is a very frightening property but what does it mean? It means that the body fat absorbs it and makes it not available for its toxic action for the time being. This goes on and the amount of DDT per unit quantity of body fat goes on increasing upto a limit at which a plateau is reached beyond which DDT content of the body fat does not increase. This plateau quantity depends on the concentration of DDT in the contaminated food. However, beyond this plateau DDT goes on getting excreted in some form or the other without causing any serious damage till its concentration in the food increases beyond some critical levels. The accumulated DDT of the body fat brings about its toxic effect if it becomes suddenly released due to the consumption of fat during fasting or starvation. These are the types of harms involved in the indiscriminate use of DDT due to which we do not allow DDT treatment of food grains. Now let us consider what type of risk is involved in malathion:

(ii) Malathion is said to be non-cumulative but it is an acute poison which causes quick death; its acute damage itself can be cummulative which is much more dangerous. It inhibits the cholinesterase activity. During ordinary spray application it is recommended that as soon as the cholinesterase reduction reaches a particular level the worker should be taken off from the spraying job and kept away till his cholinesterase level becomes normal. Now that kind of precaution is not possible if the cholinesterase level is getting reduced due to the food contamination and it may be too late when he begins to show up the toxic symptoms.

(iii) The malathion residue in grain is known to get reduced below the tolerance limit after a few months of storage. The problem to be solved is what about the risk during that period of a few months. Is it practicable to label the grain as unfit for human consumption? Will a person who has treated his grain with malathion desist from selling it if he gets a good offer before it has become fit for human consumption?

(iv) It will be difficult to apply the legal check in the case of malathion because even if some deaths occur due to malathion contamination, this contamination may get considerably reduced by the time the formalities of legal procedures connected with residue determination in the grain are completed.

(v) Even some of the known data available for malathion seem to require re-checkup. The death of 2 persons and illness of a very large number employed in the application of malathion in malaria eradication programme are difficult to explain fully on the basis of known data about malathion.

(vi) Again while some residue studies have shown that malathion contamination gets reduced rather quickly, some of the other recent studies have shown that the persistence of the residue depends very much on temperature and moisture content of the grain. Hence under certain circumstances the dangerous contamination may remain much longer than ordinarily expected and conusmers may get caught unawares.

(vii) Even under the same environmental conditions, the malathion residue lasts for different periods. For example in sorghum it has been found in this Division that malathion remains effective much longer than in wheat.

(viii) It is true that malathion has been used in some countries in treating the grain before it is loaded in the ship for export. This is tolerable in case the lot of the grain so treated is to remain on the high seas for a considerable period before reaching its destination and if the dose is such that it will be decomposed during its transit. Also such a treatment may be tolerated under special conditions when its long range storage is fully ensured. These are very specialised conditions.

(ix) Recent studies have shown that some storage pests are getting quickly resistant to malathion even where malathion has been used for surface treatment. This may lead the users to increase the quantity of the chemical applied. Thus there is a likelihood that the efficacy of this chemical may go on decreasing and its hazards may go on increasing as time passes on. Thus the safety limit which should always have a fair margin for casual errors, will go on getting narrower and narrower in the case of malathion.

(x) Once the Governmental agencies give a green light for mixing one insecticide say malathion, the user may get all the more used to this idea and may take the liberty of mixing even other more hazardous chemicals and the question of checking people from this undesirable practice may get much more complicated.

(b) Recent studies in Punjab have shown that the cultivator does not gain much by treating the grain with malathion because what he gains by reducing insect infestation he loses largely in the form of the cost of chemical treatment. This reduces the economic utility of malathion treatment to the individual cultivator and if the risk in the form of hazard involved is also taken into consideration the balance will all the more tilt against malathion treatment.

(c) No poisonous chemical should be tolerated in the food-stuff, howsoever less hazardous it may be, unless it is considered absolutely essential. This is one of the principles on which tolerance limits of various pesticides are fixed. From this point of view the mixing of pesticide with food grain is not justified. Non-chemical ways of keeping the grain safe are always to be preferred. Pusa Bin has made it quite nunecessary to treat grain chemically. Studies in Punjab have shown that even storing grain with 'bhusa' keeps it very safe. Under these circumstances a green light in favour of mixing a poisonous chemical cannot be justified even on the basis of the need for protecting the grain.

In the foregoing paragraphs, emphasis has been laid only on DDT and malathion because the former is already the most maligned insecticide and malathion is being considered as the safest. The rest come in between. Thus if the safest is not safe enough even as a sustitute for the most maligned DDT, the question of treating food grain with insecticides, except fumigants should not be seriously taken up under the present circumstances.

S. Pradhan, N S. Agrawal* & P. M. Thomas**

A New Record of A Fulgorid at Delhi

Tripetimorpha formosana Ishihara (1954) so far described only from a single female specimen from Formosa has been observed at Delhi on a grass in fair numbers during October. Twelve specimens, both males and females, have been collected and deposited in the N.P.C.

M.G.R. Menon & Swaraj Ghai

*Director, Storage & Inspection, Ministry of Food & Agriculture, Dept. of Food, New Delhi.

**Regional Manager, Food Corporation of India, C.T.O. Buildings, New Delhi-12.

New Host record of *Tetrastichus nyemitawus* Rohwer and *Tetrastichus* sp. (Hymenoptera : Eulophidae)

T. nyemitawus and *Tetrastichus* sp. were reared from *Atherigona naqvii* infesting wheat seedlings at Udaipur. This pest has not been recorded so far as host of these parasites.

G G. Kundu & Prem Kishore

Occurrence of *Neochrysocharis* sp. with a new host record in India

Neochrysocharis sp (Hymenoptera : Eulophidae) been recently reared by the authors from the grubs of *Atherigona naqvii* Steyskal infesting wheat seedlings at Udaipur. The identity of this parasite has been established by the Common Wealth Institute of Entomology. There is so far no published record of this parasitic genus from India or *A. naqvii* as its host from any part of the world.

G. G. Kundu & Prem Kishore

Screening Sorghum Germ plasm for Resistance Against shootfly

From trials on screening of Sorghum germ plasm for resistance against shootfly, a number of lines were selected as highly promising. In 'Kharif' 1970, seventy-nine lines were critically examined for ovipositional response of the shootfly. Average number of eggs per plant in I.S. Nos. 5469, 5490 and 4664 was found to be 0 13 as against 1.36 and 1.46 in the susceptible checks CSH I and Swarna respectively. It is strongly indicated that non-preference for oviposition is possibly a factor responsible for relatively less damage due to shootfly in these lines.

M.G. Jotwani, G.C. Sharma and B.G. Srivastava

Relative toxicity of insecticides to the grey weevil

Eighteen pesticides were tested as emulsion sprays for their toxicity to the adults of the grey weevil, *Myllocerus undecimpustulatus maculosus* (Desbrochers), infesting soybean crop. The descending

order of toxicity was found to be methyl parathion, lebycid, DDT, mecarbam, phosphamidon, foliothion, ethyl parathion, trichlorphon, elsan, EPN, malathion, mevinphos, formothion, endosulfan, gusathion, carbophenothion, thiodometon and morphothion. The LC_{50} values of methyl parathion and morphothion were found to be 0.001172 and 0.097270 respectively.

Shashi Verma & S.S. Misra

Carbofuran Seed treatment for the Control of Sorghum Shootfly

A large number of trials were carried out at Delhi to confirm the earlier observation regarding efficiency of carbofuran treatment for the control of shootfly. In all the trials 4 per cent seed treatment (4 parts of insecticide per 100 parts of seeds) gave highly effective control of the pest, the maximum dead-hearts being 3.0 per cent in treated plots as against 81.5 per cent in untreated plots. The carbofuran treated seeds stored for six months did not lose efficiency. The treatment was found to be compatible with Agrosan seed treatment.

M.G. Jotwani, T. R. Sukhani and Santokh Singh

Sex Attractant in Almond Moth *Cadra cautella* (Walker)

The presence of a potent sex attractant in females of the almond moth has just been demonstrated. Extracts of this from virgin females was found to attract large numbers of males in godowns infested with the pest. The chemical composition of the active ingredient suggests that it has a number of unsaturated bonds and an ester group. The active ingredient could also be distilled at 30°C. at reduced pressure.

K.N. Mehrotra & T.N.A. Farooqui

The Pusa Cubicle for the Storage of Grains

Consequent upon the success attained with the 'Pusa Bin' developed earlier in this Division, need was felt for the development on similar lines of still bigger structures where large quantities of grains could be stored in bags. This has resulted in the development

of what is known as the "Pusa Cubicle" which incorporates all the features of the "Pusa Bin". This is the first scientific innovation where an attempt has been made to store grains in bags under moisture-proof and airtight conditions. This has been tried for the storage of nearly 200 quintals of wheat which when dried to below 8% moisture content, has been preserved well for nearly one year. It is possible to store in this structure different varieties of wheat in different bags.

P. B. Mookherjee & T. D. Yadav

Estimate of Damage to Wheat by Germ Feeders

A few pests like *Trogoderma granarium* Everts, *Cadra cautella* (Walker) and *Tribolium castaneum* (Herbst) are known to be specific germ feeders of wheat grains in storage. The extent to which the larvae of these pests feed upon the germ points and render the seeds unviable is not, however, very clearly known. Studies now carried out to find the extent of germ feeding by the larvae of the above three pests in six varieties of wheat and the effect of such feeding on the viability of the wheat seeds during the course of development of the larvae under optimum conditions have revealed that so far as the first two pests are concerned, one larva is capable of feeding on and destroying the germ points on an average 1.55 and 12.28 seeds respectively and rendering such seeds unfit for sowing purposes. The feeding on the germ points is invariably discernible by the naked eye in these cases. In the case of *T. castaneum*, however, one larva is capable of feeding on an average on the germ points of 1.50 seeds which are clearly seen by the naked eye; in addition to damage visible by the naked eye, 21.11 more seeds are damaged which cannot be perceived by the naked eye and are discernible only on minute examination of the germ point under the binocular. It thus appears that the fall in viability of the wheat seeds as a result of larval feeding on the germ point is highest due to *Tribolium castaneum* followed by *Cadra cautella* and *Trogoderma granarium*.

P.B. Mookherjee & S. C. Khanna

Physiological Effects of Radiation on the Desert Locust

Studies on the effects of three sublethal doses of Co^{60} gamma radiation, *viz.* 1, 2.5 and 5 Kr on consumption, digestion and utilization of cabbage by adults of *Schistocerca gregaria* (Forskal) for a period of ten days showed that food intake and faecal production of irradiated insects decrease with time and were dose dependent. Similarly, weight gain by irradiated insects was significantly lower for the experimental period and was dose dependent. There was no significant difference in the average digestibility of dry matter and carbohydrates between irradiated and non-irradiated insects. However, nitrogen digestibility was seriously affected by irradiation so much so that no digestibility of nitrogen could be observed in 1 Kr treatment during the last two days and in 2.5 Kr treatment on the last day of the experimental period. The food and carbohydrate balance of irradiated insects decreased with time and were significantly lower as compared to non-irradiated ones. The nitrogen balance of 1 Kr treated inseets for the last three days of the experimental period was negative suggesting serious impairment in nitrogan utilization.

The rate of consumption and growth of irradiated insects were significantly lower and were dose dependent. There was no significant difference in either gross or net efficiency of food utilization to body matter for the total period between irradiated and non-irradiated insects.

P. J. Rao and K. N. Mehrotra

Agrotis ypsilon Rottenburg (Lepidoptera : Noctuidae)

Bionomics of *A. ypsilon* was worked out on fourteen species of host plants covering eight plant families. On the basis of average larval period, percentage of larvae pupated, average pupal period, growth index and percentage emergence of the moth, gram was found to support the growth of *A. ypsilon* better than the other host plants tested.

Sukumar Ray

Flight Range of Honey bee

The maximum flight range of foragers of *Apis cerania indica* Fabricius when enticed to a feeding dish was to be observed up to 1040 metres at Pusa (Bihar). However, most of the foragers could reach up to 800-900 metres. This information may be useful for these who propose to keep beehives in farms or orchards for pollination of crops as well as for getting honey.

M. Naim & K.G. Phadke

Krishi Vigyan Mela

The Rabi Krishi Vigyan Mela of the Indian Agricultural Research Institute, New Delhi was held from March 17 to 20, 1971 at the Institute Farm. The exhibits depicting findings of the Division of Entomology, included the use of neem seed as deterrent against desert locust, the Pusa Bin and the integrated control schedules for Agri-Horticultural crops.

At the Mela, Smt. Sushila Rohatgi, M.P. emphasized the need for the construction of Pusa Bin in every village and that the Government should make arrangements at block level for the easy availability of polythene, the main ingredient of Pusa Bin. This is particularly noteworthy when Sh. Fakhrurddin Ali Ahmed, Honourable Minister of Food and Agriculture, has declared that the import of food grains will be stopped by the year end.

R. N. Katiyar

Plant Protection Gleanings

The Directorate of Plant Protection, Quarantine and Storage N.H. IV, Faridabad, has recently started issuing a monthly publication entitled "Plant Protection Gleanings". Two issues were published during 1970. Now it is planned to make it a monthly. This is a very welcome addition to Plant Protection publications.

Publication of the Technical Report on Investigations on Insect Pests of Sorghum and Millets

The final technical report of this project has been just published by the Division of Entomology. A limited number of copies of this publication are available for Libraries, Colleges, Universities and other Institutions, free of cost. Those interested in obtaining this publication may kindly write to the Head of the Division of Entomology, I.A.R.I., New Delhi-12.

Books Published

An Introduction to Insect Physiology, by E. Bursell (1970) Academic Press. Berkeley Square House, Berkeley Square, London and III fifth Avenue, New York N. Y. 10003 (U. S. A) Price 70 Shillings

The Physiology of the Insect Central Nervous System, by J. E. Treherne and J. W. L. Beament (1965) Academic Press, London and New York, Price 60 Shillings.

Advances in Insect Physiology, by J. W. L. Beament, J. E. Treherne and V. B. Wigglesworth, Academic Press, London and New York, (in seven volumes) Vol. 1 (1963) Price 110 Shillings, 6 pence; Vol. 2 (1964) Price 77 Shillings; Vol. 3 (1966) Price 88 Shillings; Vol. 4 (1967) Price 95 Shillings; Volume 5 (1968) Price 100 Shillings; Vol. 6 (1969) Price 90 Shillings; Vol. 7 (1970) Price 140 Shillings.

Summer Institute in Insect Physiology and Nutrition

The summer Institute in Insect Physiology and Nutrition would be held from 12-5-71 to 10-6-71 in the Division of Entomology, I.A.R.I. New Delhi-12.

Editors

Please intimate whenever there is any change of address.

Editors

PRINTED AT THE NATIONAL COOPERATIVE PRINTING PRESS
4/2 KIRTI NAGAR INDUSTRIAL AREA, NEW DELHI-15.